

CLAIMS

1. An angular velocity measuring device comprising:

a substrate;

an angular velocity detection element having a vibrating body contained in the substrate so as to be vibrated in the first and second axial directions out of three axial directions corresponding to three axes at right angles to each other, driving means for vibrating the vibrating body in the first axial direction using a drive signal, and displacement detecting means for detecting displacement in the second axial direction of the vibrating body and outputting a detection signal when an angular velocity is applied around the third axis while the vibrating body is vibrated in the first axial direction;

drive wiring contained in the substrate and connected to the driving means of the angular velocity detection element;

detection wiring contained in the substrate and connected to the displacement detecting means of the angular velocity detecting means; and

signal processing means contained in the substrate and connected to the drive wiring and the detection wiring,

wherein the substrate is a multilayer substrate made up of a plurality of insulation layers,

wherein the detection wiring is disposed between two insulation layers inside the multilayer substrate,

wherein low-impedance wiring facing the detection wiring is contained at a position different from the detection wiring in the thickness direction of the multilayer substrate therein,

wherein, in the angular velocity detection element, an element-side drive electrode connected to the driving means, an element-side detection electrode connected to the displacement detecting means, and an element-side low-impedance electrode positioned between the element-side drive electrode and the element-side detection electrode and for cutting off the coupling between the element-side drive electrode and the element-side detection electrode positioned on the mounting surface side of the multilayer substrate are contained,

wherein, on the top surface of the multilayer substrate, a substrate-side drive electrode connected to the drive wiring and facing the element-side drive electrode, a substrate-side detection electrode connected to the detection wiring and facing the element-side detection electrode, and a substrate-side low-impedance electrode positioned between the substrate-side drive electrode and the substrate-side detection electrode and for cutting off the coupling between the substrate-side drive electrode and the substrate-side detection electrode are contained,

wherein the angular velocity detection element is mounted on the top surface of the multilayer substrate by using metal bumps,

wherein the element-side drive electrode and the substrate-side drive electrode are connected by busing metal bumps,
wherein the element-side detection electrode and the substrate-side detection electrode are connected by using metal bumps,

wherein the element-side low-impedance electrode and the substrate-side low-impedance electrode are connected at a low-impedance reference potential, and

wherein the element-side low-impedance electrode and the substrate-side low-impedance electrode are made to at least partially face each other.

2. An angular velocity measuring device comprising:

a substrate;

an angular velocity detection element having a vibrating body contained in the substrate so as to be vibrated in first and second axial directions out of three axial directions corresponding to three axes at right angles to each other, driving means for vibrating the vibrating body in the first axial direction by a drive signal, and displacement detecting means for detecting displacement in the second axial direction of the vibrating body and outputting a detection signal when an angular velocity is applied around the third axis while the vibrating body is vibrated in the first axial direction;

drive wiring contained in the substrate and connected to the

driving means of the angular velocity detection element;

detection wiring contained in the substrate and connected to the displacement detecting means of the angular velocity detecting means; and

signal processing means contained in the substrate and connected to the drive wiring and the detection wiring,

wherein the substrate is a multilayer substrate made up of a plurality of insulation layers,

wherein the detection wiring is disposed between two insulation layers inside the multilayer substrate,

wherein low-impedance wiring having a low impedance facing the detection wiring is contained at a position different from the detection wiring in the thickness direction of the multilayer substrate therein,

wherein, in the angular velocity detection element, an element-side drive electrode connected to the driving means, an element-side detection electrode connected to the displacement detecting means, and an element-side low-impedance electrode enclosing the element-side drive electrode or the element-side detection electrode and for cutting off the coupling between the element-side drive electrode and the element-side detection electrode positioned on the mounting surface side to the multilayer substrate are contained,

wherein, on the top surface of the multilayer substrate, a

substrate-side drive electrode connected to the drive wiring and facing the element-side drive electrode, a substrate-side detection electrode connected to the detection wiring and facing the element-side detection electrode, and a substrate-side low-impedance electrode enclosing the substrate-side drive electrode or the substrate-side detection electrode and for cutting off the coupling between the substrate-side drive electrode and the substrate-side detection electrode are contained,

wherein the angular velocity detection element is mounted on the top surface of the multilayer substrate by using metal bumps,

wherein the element-side drive electrode and the substrate-side drive electrode are connected by using metal bumps,

wherein the element-side detection electrode and the substrate-side detection electrode are connected by using metal bumps,

wherein the element-side low-impedance electrode and the substrate-side low-impedance electrode are connected at a low-impedance reference potential, and

wherein the element-side low-impedance electrode and the substrate-side low-impedance electrode are made to at least partially face each other between the element-side drive electrode and the element-side detection electrode.

3. An angular velocity measuring device as claimed in claim 2, wherein the opposite portion, in which the element-side low-

impedance electrode and the substrate-side low-impedance electrode face each other, encloses the element-side detection electrode and the substrate-side detection electrode.